T01D05 – Classwork I: Molecular (Covalent) Nomenclature

Name KEY

Directions: Well we are back from primary day, and I will bet you are ready to write more formulas. This time we are going to write the names of covalent or molecular compounds. We are going to stick to binary compounds (composed of only two elements). If we try to name molecular compounds or three or more elements they do not following this nomenclature but are more precise. I will illustrate later,

Molecular compounds are composed of two non-metals. We cannot use the periodic table to predict the oxidation state or valence of non-metals. If you look at your periodic table at the non-metals notice all of the oxidation states available. **Example—Nitrogen can be +-3,5,4,2—because of this I cannot choose one of them over another.**

Instead when I write the formulas or I name molecular compounds I have to do it another way. The process we use is as follows. The element (or ion) written first is named as it is for ionic compounds and the second element (or ion) will ALWAYS END IN **IDE**.
For molecular compounds we will be using prefixes to tell someone how many are in a compound. Remember when naming ionic compounds we never use prefixes but for molecular compounds we will always use prefixes. The prefixes used are:

Prefix	meaning	prefix	meaning
mono	1	di	2
tri	3	tetra	4
penta	5	hexa	6
hepta	7	octa8	
nona	9	deca	10

Here are a few examples :

Formula	Name
SF_2	sulfur difluoride
OCl	oxygen monochloride
PCl_3	phosphorus trichloride
$AsCl_5$	arsenic pentachloride

Mono is a prefix used but NEVER used for the first element. That is why we do not say monosulfur difluoride or monooxygen monochloride, etc.

Writing the formulas of or naming molecular is much easier than for ionic compounds. All I have to remember is to use (or remember) the correct prefix. There is no cross multiplying like in ionic compounds. We do not have to worry about the individual charges.
Now I want you to try some. Be neat and write legibly. Again the first one done does not necessarily win. Inert gases can also form compounds so be careful. All of the following are molecular compounds. There are **NO** ionic compounds listed. **ALL work.**

Formula	Name
SF_6	sulfur hexafluoride

OBr_2	oxygen dibromide
XeF_4	xenon terafluoride
N_2O	dinitrogen monoxide
NO	nitrogen monoxide
N_2O_3	dinitrogen trioxide
$AsCl_5$	arsenic pentachloride
$SbCl_3$	antimony trichloride
NO	nitrogen monoxide
NI_3	nitrogen tri-iodide
N_2O_5	dinitrogen pentoxide
~~ClF~~	~~ClF~~
OF_2	oxygen difluoride
N_2O_4	dinitrogen tetroxide
NO_2	nitrogen dioxide
P_2O_5	dinitrogen pentoxide
P_4O_{10}	tetraphosphorus decoxide
$SiCl_4$	silicon tetrachloride
CCl_4	carbon tetrachloride
SiO_2	silicon dioxide
SO_2	sulfur dioxide
CO	carbon monoxide

Formula	Name
CO_2	carbon dioxide
BrCl	bromine monochloride
KrO_4	krypton tetroxide
$AsCl_3$	arsenic trichloride
OCl_2	oxygen dichloride
XeI_4	xenon tetraiodide
PF_5	phosphorous pentafluoride
SI_6	sulfur hexaiodide
Sb_2O_3	diantmony trioxide
SeO2	selenium dioxide

We will only be dealing with binary molecular compounds. The reason is that when you get to 3 or more elements in a molecular compound the nomenclature is much more complicated. For example, when you put C, H and O into a molecular compound there are hundreds if not thousands of possibilities. You can have CH_3OH, C_2H_5OH, C_3H_7OH, etc. or CH_3OCH_3, $C_2H_5OC_2H_5O$, etc. Each of these would be name for the functional group they contain. If you remember from biology, organic chemistry tends to be much more complex than inorganic which we do. I have only listed a few examples. There are many more possibilities. We will talk more about these in Organic Chemistry and Biochemistry.

CH_3OH is methyl alcohol or methanol

C_2H_5OH is ethyl alcohol or ethanol

C_3H_7OH is propyl alcohol or propanol

CH_3OCH_3 is dimethyl ether

$C_2H_5OC_2H_5$ is diethyl ether.